ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

AMERICIUM

CAS #7440-35-9

Division of Toxicology ToxFAQs™ **July 2001**

This fact sheet answers the most frequently asked health questions (FAQs) about americium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Very low levels of americium occur in air, water, soil, and food. Exposure to very large amounts of radioactive americium may result in increased cancer risk. Americium has been found in at least 8 of the 1,585 National Priorities List (NPL) sites identified by the Environmental Protection Agency (EPA).

What is americium?

Americium is a man-made radioactive chemical. Americium has no naturally occurring or stable isotopes. Two important isotopes of americium are americium 241 (^{241}Am) (read as americium two-forty-one) and ^{243}Am. Both isotopes have the same chemical behavior in the environment and the same chemical effects on your body.

^{241}Americium is used in ionization smoke detectors. There is no commercial use for ^{243}Am.

Nuclear explosions or degradation of plutonium generate ^{241}Am. ^{243}Am is produced inside nuclear reactors from ^{241}Am or from the decay of plutonium 241. Both americium isotopes decay into radioactive elements. Both isotopes give off alpha particles as they decay. It takes about 432 years for half of ^{241}Am to give off its radiation and about 7,370 years for ^{243}Am; this period of time is called the half-life.

What happens to americium when it enters the environment?

❑ ^{241}Am released to the air (from nuclear weapon tests) will be associated with particles and will settle to the soil and water in rain or snow. Small particles in air can travel far from the point of release.
❑ ^{241}Am released into water will stick to particles in the water or the sediment at the bottom.
❑ ^{241}Am strongly sticks to soil particles and does not travel very far into the ground.
❑ Plants may take up small amounts of ^{241}Am from the soil.
❑ Fish may take up ^{241}Am, but little builds up in the fleshy tissue. In shellfish, ^{241}Am is attached to the shell and not to the parts you normally eat.

How might I be exposed to americium?

❑ The general population may be exposed to very small amounts of ^{241}Am in air, water, soil, and food. They may also be exposed to very low levels of radiation from smoke detectors.
❑ People working at sites where nuclear waste is stored or at nuclear power plants may be exposed to higher levels of americium.
❑ People producing or handling ^{241}Am in smoke detectors or other devices may be exposed to higher levels of radiation.
❑ As a result of a nuclear accident, people may be exposed to higher than normal levels of radiation.

How can americium affect my health?

The radiation from exposure to americium is the primary cause of adverse health effects from americium. Inside your body, americium is concentrated in your bones, where it remains for a long time. The radiation given off by ^{241}Am can change the genetic material of the bone cells and this could result in the formation of bone cancers. The chance of getting cancer is low at low doses, and increases as the dose increases.

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Laboratory animals exposed to very high levels of americium had damage to the lungs, liver, and thyroid. However, americium is accumulated in these organs for only a relatively short time. It is unlikely that you would be exposed to amounts of americium large enough to cause harmful effects in these organs.

How likely is americium to cause cancer?

No human studies specifically associate exposure to radioactive americium with an increased cancer risk.

Because radioactive americium emits ionizing radiation, the same types of cancers as those observed in Japanese survivors of the atomic bombing incidents might be expected among individuals acutely exposed to high levels of radiation from a radioactive americium source.

Studies in animals have demonstrated that internal exposure to ^{241}Am results in the development of cancer in the tissues that store this element.

How can americium affect children?

Children can be affected by americium in the same ways as adults. However, exposure as children would let the americium build up in bone to higher levels. This could cause bone cancer after many years. While this may occur, there are no actual data showing that children are more sensitive than adults to americium.

How can families reduce the risk of exposure to americium?

Higher-than-normal levels of americium may be in soil near a nuclear waste site, nuclear reactor, or plant that manufactures ionization smoke detectors. Consequently, prevent your children from eating dirt and make sure they wash their hands frequently.

In the unlikely case that you are exposed to high levels of radioactive americium because of accidental release at a manufacturing facility, at a nuclear plant, or because a nuclear weapon has been damaged or detonated, follow the advice of public health officials who will publish appropriate guidelines for reducing exposure.

Is there a medical test to show whether I've been exposed to americium?

If americium were to enter your body from americium-contaminated air or food, radiation detectors could measure radiation from your blood, urine, feces, tissue samples, or teeth. Radiation detectors are not normally available in your doctor's office, so the samples must be sent to a special laboratory.

Special radiation detectors could also be used to measure the radiation that leaves your whole body from americium that is inside your body.

Has the federal government made recommendations to protect human health?

The Nuclear Regulatory Commission (NRC) has set limits of 0.00000002 microcuries per cubic meter of air for ^{241}Am released to the air and 0.00002 microcuries per liter of water for releases to water by licensed facilities (microcurie is a radiation unit).

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2001. Toxicological Profile for Americium (Draft for PublicComment). Atlanta, GA: U.S. Department of Health and Human Services.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.